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Nuclear Science Division Newsletter

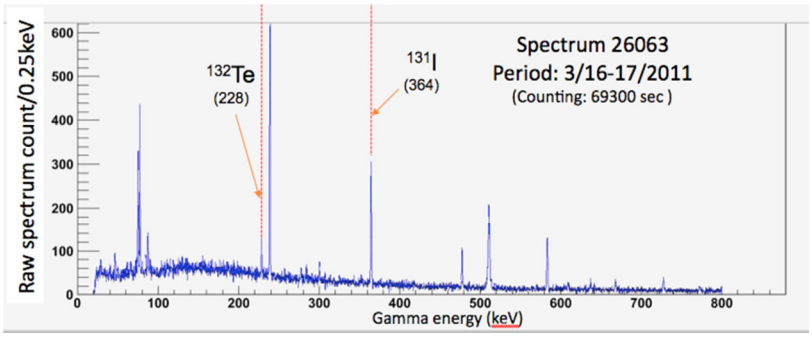
In this issue: **March, 2011**

Short-lived radioisotopes observed in air and rainwater at LBNL Low Background Facility (LBF) at LBNL; most likely from Fukushima powerplant

Staff at the LBNL low background facility (LBF) have been studying radioactivity contents of local air and rain water samples after learning that radioactivity was released from the Fukushima nuclear reactors in Japan, following the earthquake and tsunami. Since March 14, 2011 (US PST) air samples have been collected on a daily basis (24 hours sampling period) outside Bldg. 72, and have been analyzed by a sensitive gamma-ray detector at the Facility. In parallel, rainwater samples were collected and analyzed in an offsite counting station in Oroville, Ca. Two different short-lived radioactive isotopes (^{131}I with an 8d half-life, and ^{132}Te with a 3d half-life) were first positively identified in the data from the Mar. 16-17 air sample. (see figure). The very short half-lives indicate that they were released from one of the reactor cores, rather than from fuel rods in a cooling pond. The observed level of radioactivity is within US safety limit to human health.

Even though minute levels of ^{131}I could be present in air due to release from close-by medical facilities, the simultaneous presence of other radioactive isotopes expected from nuclear fission (e.g. ^{132}Te in this case) is a strong indication that the observed radioactivity is related to the reactor accident. Since then, LBF has been tracking the relative intensity of several radioactive isotopes such as ^{131}I, ^{132}I, ^{132}Te, ^{137}Cs, ^{143}Cs etc. that could be seen in the daily samples. The study will continue as long as radioactivity continues to be detected.

The LBF has a long history of supporting fundamental physics research programs at LBNL and elsewhere, as well as serving the Laboratory's waste radioactivity assay need that requires a high sensitivity measurement.



Gamma-ray energy spectrum for the air sample collected from March 16-17, 2011, showing positively identified reactor incident related radioactivity peaks. The unlabelled peaks are either from known backgrounds of the detector system or radon air related.

2011 LBNL Nuclear Science Day for Girl Scouts and Boy Scouts

On March 5, 2011, the Nuclear Science Division (NSD) hosted 150 youths and 60 leaders at its inaugural Nuclear Science Day for Girl Scouts and Boy Scouts. This event was co-sponsored by Berkeley Lab's Center for Science and Engineering Education (CSEE). The students were treated to a variety of lectures and hands-on activities (such as building an aluminum foil electrometer, plus a tour of the 88 inch cyclotron. These activities gave the scouts a strong start toward a merit badge in nuclear science.

This event was part of a lab-wide strategic initiative to improve community relation. Event planning began in Fall 2010. The local Girl Scout and Boy Scout councils provided tremendous help in distributing event information to their members. The response from the community was overwhelming --- 400 would-be registrants had to be turned away when the planning committee stopped counting registrations that were still coming in three weeks before the event. This enthusiasm from the community was matched by the energy of 30 volunteers from NSD and other divisions, who led different hands-on activities, served as tour guides to the cyclotron and its associated experimental areas, and provided logistic support

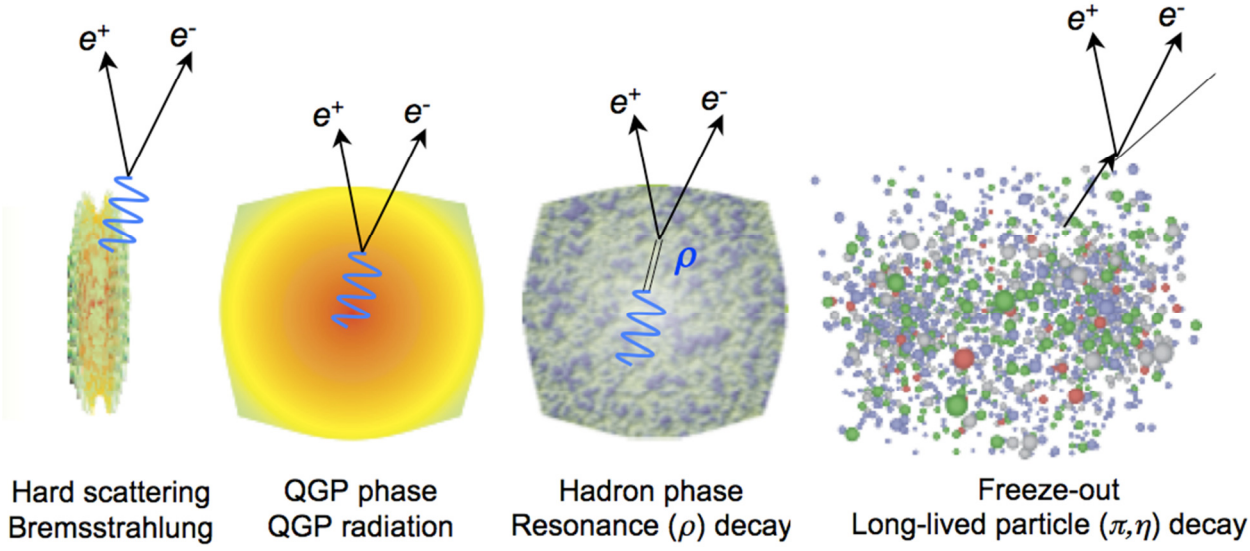
Some of the girl and boy scouts, adult leaders and NSD volunteers who participated in the Nuclear Science Day.

STAR Dielectron Workshop at LBNL

On March 10th and 11th, the NSD Relativistic Nuclear Collisions group hosted a special focus meeting on dielectron production in STAR. The purpose of the meeting was to intensively discuss dielectron analyses in STAR, and make preparations to get results ready for Quark Matter 2011. Most of the 20 participants were STAR collaborators, supplemented by a few theorists and other experimentalists.

The figure shows how dielectrons are produced via a number of mechanisms in ultra-relativistic ion collisions. The mechanisms include leptonic decays of vector mesons (e.g. the ρ^0, ω^0 and ϕ^0 , plus heavier mesons like the J/ψ), Drell-Yan production, initial state radiation, and other sources. Dielectrons are an important probe of the medium produced in relativistic heavy-ion collisions. For example, the masses and widths of the vector mesons may be altered in dense hadronic media.

Because of the small cross-sections, experimental studies of dielectron production are difficult. One of the main purposes of the workshop was to discuss experimental techniques, in preparation for an analysis of the STAR run 10 data.



Di-electron production sources in various stages in ultra-relativistic heavy ion.

Details of this meeting can be found at:

http://rnc.lbl.gov/~xdong/Dielectron/dielectron2011.html

NSD Fragments

In February, postdoc Ermes Braidot joined us from Utrecht. He will work on ALICE, and will be based at CERN.